# 3.0 ENVIRONMENTAL INVESTIGATION

## *3.1 ENVIRONMENTAL INVESTIGATION METHODOLOGY*

Air Monitoring Data

During the Geophysical Investigation, Apex utilized a Q-Rae 4-gas air monitoring meter that was attached to the VT-150 to assess the atmospheric quality within the tunnels. The instrument is equipped with sensors for $O_2$, LEL, CO, and $H_2S$. Based on the unknown air quality within the tunnels and the confined nature of the tunnels, the use of the Q-Rae 4-gas meter provided important information on the atmospheric air quality for future entrance into the tunnel system. While the VT-150 was deployed within the tunnels the Q-Rae data logged air monitoring data. The Q-Rae was not deployed in some tunnel sections due to high standing water.

Limited Asbestos Survey

Apex conducted a limited asbestos survey at the subject property on April 10, 2015. Apex visually inspected accessible interior portions of the tunnel system for the presence of friable and non-friable asbestos-containing materials (ACM). In addition to the visual survey, Apex also reviewed video data gathered during the Geophysical Investigation within areas that were identified to be inaccessible.

Suspect ACMs that are homogeneous in nature (i.e., uniform in color and texture) were identified and touched to determine friability (ability to be reduced to powder by hand pressure), sampled by removing a small piece that was placed in a labeled sample bag, and given a specific identifier for reference, e.g. ACM-01. For a given homogeneous area, one or more samples were collected in a randomly distributed manner in accordance with Asbestos Hazard and Emergency Response Act (AHERA) provisions as referenced in the Occupational Safety and Health Administration (OSHA) asbestos in construction standard [29 CFR 1926.1101].

Every reasonable attempt was made to locate ACM. However, areas that were inaccessible can only be addressed through extrapolation of conditions in accessible building space and review of building plans, specifications, or other tunnel documents provided to Apex. Inaccessible is defined as areas of the tunnel that could not be tested (sampled) without destruction of the structure or areas that were deemed unsafe to enter.

Changes in the condition of the subject property may occur with time due to either natural processes or human activities. The findings presented in this report are based on site conditions existing at the time of the inspection. Apex cannot be responsible for any errors or omissions in this assessment resulting from incomplete or inaccurate disclosures.

The inspection excluded any/all dismantling of mechanical systems such as pipe flanges, furnaces, terminal heating/cooling units, storage tanks, ducts, sanitary equipment, etc.

The collected samples were analyzed by EMSL Analytical, Inc. (EMSL), which is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos content using polarized light microscopy in conjunction with dispersion staining (PLM/DS).

Apex focused the survey on only the tunnel system and materials that are defined as "suspect ACM" by Environmental Protection Agency's (EPA's) AHERA, which include: Thermal system insulation (TSI) (pipe/boiler lagging, duct insulation); surfacing materials (spray-on insulation, texturing materials, plaster); and miscellaneous materials (cement panels, vibration joints, etc.).

Limited Lead-Based Paint Inspection

The EPA established lead-based paint (LBP) general industry regulations (40 CFR 745 Subpart L). These standards outline lead-based paint inspection protocols as well as abatement activities. The EPA considers paint to be lead based when content meets or exceeds 0.5% by weight. This inspection was conducted along the guidelines set forth by the U.S. Department of Housing and Urban Development (HUD) Guidelines Chapter 7.

Concurrent with Apex's asbestos survey, Apex visually inspected the painted surfaces within accessible areas of the tunnels. LBP testing was conducted by collecting paint chip samples from each area with separate paint types (colors, textures, etc.) and chips were submitted to EMSL's lab for content analysis. The EPA and the State of Virginia considers paint to be lead based when content meets or exceeds 0.5% by weight. This lead paint testing is designed to supply Fairfax County with knowledge of the presence of LBP, but is not meant to qualify as a lead survey for a risk assessment (e.g. HUD requirement).

Apex visually inspected accessible areas of the tunnel system for the presence of painted surfaces. In addition to the visual survey, Apex also reviewed video data gathered during the Geophysical Investigation from areas that were identified to be inaccessible. Apex focused the investigation on only the tunnel system and painted materials that were located in these areas.

Mercury Containing Devices

Fluorescent lamps, equipment gauges, and heating/cooling thermostats often contain a small amount of mercury that is regulated under EPA's Resource Conservation and Recovery Act (RCRA). Concurrent with Apex's asbestos survey, Apex conducted a visual survey of accessible light fixtures, thermostats, and mechanical gauges for mercury within the tunnel system, where accessible. In addition to conducting a visual

investigation, Apex reviewed recorded videos conducted during the Geophysical Investigation.

Polychlorinated Biphenyls (PCBs)

The EPA banned the use of PCBs in 1976. Thus, all light ballasts manufactured through 1979 are presumed to contain PCB's. Additionally, the EPA requires that light ballasts manufactured after 1979 be labeled by the manufacturer indicating that the ballasts do not contain PCB ("NO PCBs" notation).

Concurrent with Apex's asbestos survey, Apex conducted a visual investigation of accessible light fixtures and light housings within the tunnel system. In addition to conducting a visual investigation, Apex reviewed recorded videos conducted during the Geophysical Investigation.

Visual Mold Survey

Apex conducted a walk-through inspection of accessible areas of the tunnel system to document signs of visible mold growth, water damaged materials, and other potential sources of mold growth (e.g., standing water, leaks). Building materials located within the tunnels were visually assessed for evidence of mold growth.

## *3.2 ENVIRONMENTAL INVESTIGATION RESULTS*

Air Monitoring Data

Based on field conditions, the Q-Rae could only be attached to the VT-150 from portions of tunnels at the access locations at W-16, W-12, W-01, W-18, and W-13. The other entry points were inaccessible for deployment of the VT-150 or contained an excessive amount of water. At the entry points where the Q-Rae could not be attached to the VT-150, Apex conducted spot readings at multiple locations within the entry point by placing the meter into the entry.

Based on logged data as well as field spot readings; oxygen levels, combustible gases, carbon monoxide, and hydrogen sulfide were identified to be within regulatory guidelines for safe entry at that point in time where we put the Q-Rae. Apex can't attest to the air quality at any other times and/or points within the tunnel system.

Limited Asbestos Survey

Apex collected a total of four samples of suspect ACM. Based on the limited tunnel accessibility and structural safety concerns at accessible areas, Apex collected samples only from the access points at W-16 and W-12. All samples were sent to EMSL, located in Beltsville, Maryland. A summary of the samples collected and laboratory results are presented in **Table 3-1**. EMSL's laboratory Certificate of Analysis and chain-of-custody documentation are presented in **Appendix D**. The standard for ACM is 1.0% by volume.

**Table 3-1 – Summary of Suspect Asbestos Containing Materials Testing**

| Sample ID | Description / Location | Analytical Results | Quantity |
|---|---|---|---|
| **LWH-ASB-1** | **Pipe Wrapping – Large Pipe – W-16 Entrance Point** | **5% Chrysotile** | **Approximately 4,000 LF** |
| LWH-ASB-2 | Pipe Wrapping – Small Pipe – W-16 Entrance Point | ND | Approximately 4,000 LF |
| **LWH-ASB-3** | **Pipe End Cap – W-16 Entrance Point** | **12% Chrysotile** | **Approximately 150 Locations** |
| LWH-ASB-4 | Pipe Wrapping – W-12 Entrance Point | ND | Approximately 4,000 LF |

ND – None Detected
LF – Linear Feet

Based on the laboratory results, Apex has estimated the following:

- Approximately 4,000 linear feet of pipe wrapping is considered ACM; and
- Approximately 150 locations of pipe end cap is considered ACM.

Limited Lead-Based Paint Inspection

Apex collected a total of two paint chip samples. Due to limited access, Apex only collected samples from the entrance point of W-16 for analysis. The samples were submitted to EMSL and AIHA accredited laboratory in Beltsville, MD. Laboratory test results of 0.5% by weight or greater are considered LBP. Analytical results are presented in **Table 3-2**. EMSL's laboratory Certificate of Analysis and chain-of-custody documentation are presented in **Appendix D**.

**Table 3-2 – Summary of Lead-Based Paint Sampling**

| Sample ID | Description / Location | Analytical Results |
|---|---|---|
| LWH-LBP-1 | Tunnel Wall – W-16 Entrance Point | 0.030 % wt. |
| LWH-LBP-2 | Tunnel Door Casing – W-16 Entrance Point | 0.48 % wt. |

Based on the laboratory results, lead was not detected in the collected paint chip samples at or above the HUD action level of 0.5% by weight. EMSL's laboratory Certificate of Analysis and chain-of-custody documentation are presented in **Appendix D**.

Mercury Containing Devices

Based on visual investigations of the accessible areas of the tunnels and video reviewed from the Geophysical Investigation, Apex did not identify any fluorescent lamps, equipment gauges, and/or heating/cooling thermostats that would be considered as suspect containing mercury containing devices within the inspected areas of the tunnels.

Polychlorinated Biphenyls (PCBs)

Based on visual investigations of the accessible areas of the tunnels and video reviewed from the Geophysical Investigation, Apex did not identify any lighting housings and/or transformers that would be considered as suspect PCB containing devices within the inspected areas of the tunnels.

Visual Mold Survey

Based on visual investigations of the accessible areas of the tunnels and video reviewed from the Geophysical Investigation, Apex did not identify evidence of visible mold growth, however Apex did identify areas located throughout the inspected tunnels to contain standing water and/or water damaged materials and therefore there is a high potential for mold growth due to standing water and water intrusion through the mortar joints.